

EVALUATION OF THE INTEGRATED AMT/AMT-T CURRICULUM: YEAR 1 ACTIVITIES

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1.1 INTRODUCTION

The report is divided into four major sections. The Background outlines the need for pursuing this research to implement and evaluate portions of the integrated Aviation Maintenance Technician Transport ([AMT-T](#)) curriculum while the second section describes the revised curriculum development effort and the third develops the methodology and assessment tools used in conducting the evaluation. The final section outlines the directions for future work.

1.2 BACKGROUND

For the Federal Aviation Administration (FAA) to provide the public with continuing safe, secure, efficient and reliable global air transportation, it is important to have undergraduate aircraft maintenance technology programs that encourage careers in the field and address the FAA technology requirements for the future.[3,4,5](#) The Greenville Technical College Aircraft Maintenance Technician (GTC AMT) program is the only one within the South Carolina State Board for Technical and Comprehensive Education System offering day and evening classes. GTC operates a two-year associate degree AMT program, structured in accordance with the curriculum for Federal Aviation Regulation (FAR) Part 147 Aviation Maintenance Technician institutions. The program operates under Air Agency Certificate # EI9T113R and was certified in fall 1987 with an authorized maximum enrollment of 120 students. Operations are held in 18,000 square feet of modern hangar space located at Donaldson Industrial Air Park.

This research effort will enable both the establishment of technician performance benchmarks relative to the Part 66 curriculum requirements and the evaluation of the relative merits/consequences of alternative training strategies. These results, then, will form the foundation of a comprehensive [AMT/AMT-T](#) training program that will ultimately result in improving the safety and reliability of aircraft maintenance technology and maintenance operations and as a consequence provide the aviation industry with ready access to licensed technicians, a more stable and reliable work force, increased safety performance, improved quality assurance, higher consumer satisfaction, and increased profitability and competitiveness.

Three new Advisory Circulars for aircraft maintenance technology under the [FAA](#) Research, Engineering, and Development Authorization Act of 1997, Section Three (Law 105-155) mandate research on future training requirements for projected changes in the regulatory requirements of aircraft maintenance and powerplant licensees. These mandates call for new/updated safety

enhancements for [AMT/AMT-T](#) training programs and skill requirements for technicians. The introduction of the new Part 66, in particular, imparts future training requirements, both for training levels and objectives, for AMT/AMT-T personnel training procedures. Thus, applied research is needed to develop and implement an alternative methodology for a learner-focused curriculum that is integrated into laboratory experiences via interactive modules of skill mastery and evaluation/assessment. Since the general industry of aircraft maintenance technology requires more rapid training in appropriate skills while also enhancing quality and safety performance, the results of this research will serve as a model for changing training and continuing education certification for aircraft maintenance technology for general and transfer technician application. The alternative learning methodologies can be applied to improving safety standards that govern civil aircraft worthiness and operational performance.

1.2.1 Research Objectives

The newly integrated [AMT/AMT-T](#) curriculum for aviation maintenance technician and aviation maintenance technician-transport was developed as a performance-outcome-based integrated curriculum to address the aircraft maintenance industry's need for better-qualified AMT personnel, possessing higher levels of technical and human factors expertise.³ The general objective of this research is to develop, implement, and assess the newly integrated curriculum, using alternative training methodologies for technician technology skill transfer and application that demonstrate acceptable student performance through the various levels of the integrated curriculum. The specific objectives of this research are twofold:

1. Conduct applied research that builds upon previous [FAA](#) human factors research to implement the [AMT/AMT-T](#) performance-outcome-based curriculum and encompasses safety, team building, human factors issues, error control and analysis, and computer and technical material use by integrating classroom experience, interactive hands-on laboratory exercises of skill mastery and evaluation/assessment, and multimedia based educational/learning modules for active learning experiences.
2. Develop an assessment methodology and conduct a detailed assessment of portions of the integrated curriculum to test whether it meets educational objectives and student performance objectives, that is the desired learning outcomes, and then use these results to further enhance the effectiveness of the curriculum, the learning experience, and the educational delivery system.

Portions of the integrated curriculum included in this project were selected from the units of Ground Operations and Safety, Aircraft Powerplant (Gas Turbine Engine Model), and Aircraft Structures. The specific components were determined during the project-planning phase. This project is managed by the Aircraft Maintenance Technician Program at Greenville Technical College and conducted in collaboration with the Department of Industrial Engineering at Clemson University (CU). Other partners actively involved in this research include Lockheed Martin Aircraft Center (LMAC) and Stevens Aviation. Moreover, the research also directly supports undergraduate and graduate students.

1.3 CURRICULUM DEVELOPMENT

The research started with the planning phase which established the role of the various participants in the research in addition to developing a detailed schedule of activities identifying important milestones and key deliverables. The primary participants and their respective roles in the research are as follows:

- [GTC AMT](#) serves as the test bed for implementing and testing the curriculum. The AMT program is currently developing the training material, the educational methods and the technology in cooperation with the [CU](#) research team.

- [CU](#) research team was tasked with the development of the assessment methodology and is jointly conducting assessment with instructors from the [GTC AMT](#) program along with support from industry partners. The CU team is also actively involved in the development of the educational methods, the training material, and the identification of learning strategies.
- [LMAC](#) and Stevens Aviation have provided industry input on curriculum development and assessment activities.

The classic task analytic instructional design methodology was used to develop curriculum material.[6,7,8,9](#) In specific, the systems approach model was followed ([Figure 1](#)).

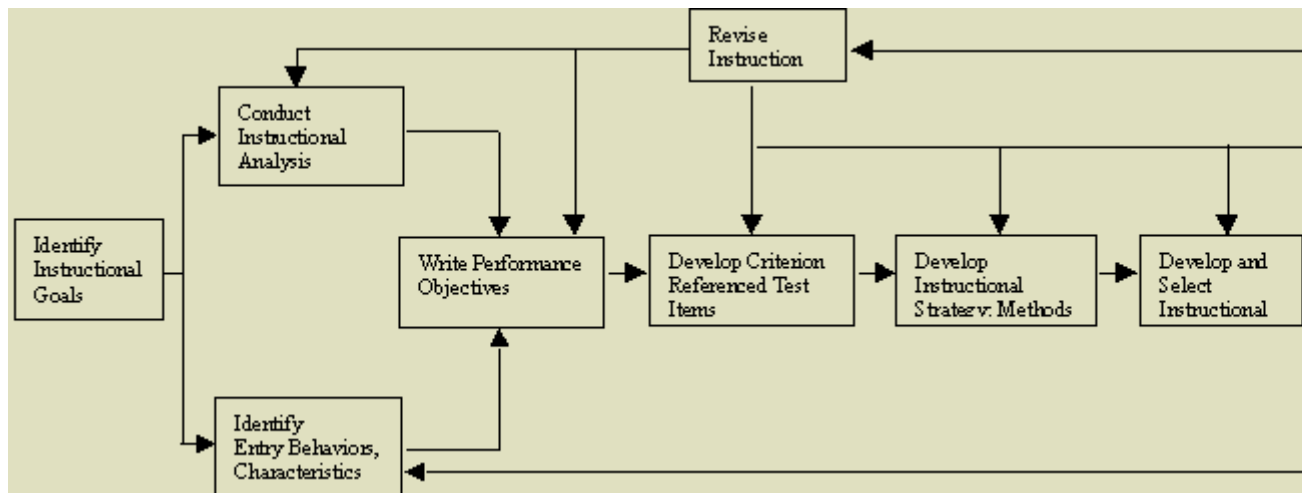


Figure 1. A systems approach model for designing instruction

The instructional design methodology focuses on three aspects:

1. Content- The curriculum content specifies the instructional material to be covered as part of the instructional units.
2. Methods- The methods specify the learning strategies to be used, including feedback, active, feed forward, drill and practice, progressive parts, and others.
3. Delivery - The delivery system focuses on the way instruction is imparted, for example, classroom based, on-the-job, simulated on-the-job, laboratory-based, or computer based.

As a first step, the faculty developed an expanded statement of the missions and goals for the [AMT](#) program ([Figure 2](#)). Following this step a detailed goals statement identifying the means of assessment and the criteria for success for the three representative courses were developed ([Figures 3 - 5](#)). This was followed by content development. As an initial prototype the Ground Handling and Services Course was selected Using the Knowledge, Application and Manipulative Skills framework ([Table 2](#)) and the student performance objectives ([Table 1](#)), a detailed course outline was developed. Next, the developers identified the appropriate content, learning strategy and delivery system based on the resources available for each of the nineteen student performance objectives. In creating the content, the developers evaluated the use of the alternate delivery systems listed below:

1. Classroom: Lecture material, overheads, tests, instructional support material, exams, etc. were developed.
2. Lab exercises: Laboratory exercises and hands-on projects were identified and developed.
3. Multimedia: Multimedia-based computer instructional modules that can be integrated to emphasize classroom-based instruction were developed. Examples include streaming video of aircraft towing operations and confined space operations.

Aviation Maintenance Technology/Greenville Tech C (Department/School/Administrative Unit)	
Doyle Arnold (Completed by:)	1999 Academic
Expanded Statement of Institutional Purpose (In this section, please provide a statement that demonstrates how your department/unit relates to your college or division's statement of institutional purpose and through the college/division to the Clemson University's mission and goals.)	
Mission: Provide quality post-secondary programs and services primarily to residents of Greenville County	
The faculty of the Department of Aviation Technology has adopted these program objectives and outcomes to guide the conduct and continuous improvement of the Aviation Maintenance program Goal(s): Provide credit and non-credit courses and programs to meet both student and the assessed employment needs of the service area and to encourage economic community development. Community Goals <ul style="list-style-type: none"> • Cultivate a partnership with industry which guides and continuously improves the training program • Produce students whose skills and knowledge are actively sought by industry employers • Produce students capable of meeting the employment needs of the community FAA Goals <ul style="list-style-type: none"> • Provide a course curriculum designed to meet the objectives and guidance of Part 147 Student Goals <ul style="list-style-type: none"> • Provide a State of the Art learning experience for each student based upon individual needs • Instill the skills and knowledge necessary for the student to pass the FAA C Practical Examination • Provide a challenging course curriculum designed to stimulate thought and the learning process • Provide an atmosphere which encourages student participation • Provide practical [all] exercises designed to build upon classroom presentation and develop student's skills 	

Figure 2. Assessment plan

Department Aircraft Maintenance Technology		Academic Year 1999
Program Title and Degree (if applicable) ACM 115 Ground Handling and Servicing		
Goal: Provide instructions on engine starting, ground operations, aircraft movement handling and servicing, safety requirements and procedures. Also covered is interpretation of aircraft weight and balance procedures as listed in FAR Part 147 Appendix A.		
Intended Educational (Student), Research or Service Outcomes, Administrative Objectives or Expected Results (Please duplicate and use this page. It is best to include the continuous numbers on each page.)		
Expected Results: Students satisfactorily completing all courses objectives passing grade for the course		
—	Indicator	<p>Means of Assessment (the procedures, strategies, or means by which you will collect information on the outcome objective)</p> <p>Means of assessment include written tests and exams, practical lab exercises, and instructor observations.</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is established based on a minimum passing score of 70% on written tests and exams. Success for practical lab exercises is determined by the project in accordance with established industry standards or manufacturer specifications.</p> <p>Instructor's observation factors in as a percentage of the student's overall grade. Items evaluated include safety, shop procedures, attitude, and class participation.</p>
—	Indicator	<p>Means of Assessment (the procedures, strategies, or means by which you will collect information on the outcome objective)</p> <p>Written tests and quizzes consisting of multiple choice, fill in the blank, and essay type questions are used to assess the knowledge of the student.</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is established based on a minimum passing score of 70% on written tests and exams.</p>
—	Indicator	<p>Means of Assessment (the procedures, strategies, or means by which you will collect information on the outcome objective)</p> <p>Practical lab exercises for this objective consists of movement of aircraft, connecting/operating ground support equipment, aircraft refueling operations, and weight and balance computations. Each objective is demonstrated by the instructor, then the students are provided an opportunity to complete the practical exercise.</p>

Figure 3a. Assessment plan: Ground handling and servicing

	<p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is measured by observing the students perform each operating must be performed in accordance with industry standard manuals, or manufactures manual.</p>
Indicator	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Throughout the course the instructor is observing each student and classroom participation. Student's participation in the class practical lab exercises is encouraged.</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Each student is provided an opportunity to practice all Lab Exercises evaluation. Success is established when the student completes exercise without jeopardizing safety, damage to equipment, and with the guidance in the appropriate maintenance manual, FAA manufactures' manual, The students earn a pass or fail rating based on they completed the exercise.</p>
Indicator	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p>
Indicator	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p>
Indicator	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p>

Figure 3b. Assessment plan: Ground handling and servicing

Department <u>Aircraft Maintenance Technology</u> Academic Year _____	
Program Title and Degree (if applicable) <u>ACM 224 Turbine Engine Overhaul</u>	
Goal: <u>Provide instructions on the history, theory, construction, and principles turbine engines, unducted fans, and auxiliary power units. Also included in engine installations, engine maintenance, testing, adjustments, hot section inspection procedures as listed in FAR Part 147, Appendix D</u>	
Intended Educational (Student), Research or Service Outcomes, Objectives or Expected Results (Please duplicate and use this page. It is best to include continuous numbers on each page.)	
Expected Results: Students satisfactorily completing all course objectives Passing grade for the course	
1.	<p>Indicator</p> <p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Means of assessment include written tests and exams, practical lab exercises, and instructor observations</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is established based on a minimum passing score of 70% on written tests and exams. Success for practical lab exercises is determined by the project in accordance with established industry standards or specifications.</p> <p>Instructor's observation factors in as a percentage of the student's performance. Items evaluated include safety, shop procedures, attitude, and</p>
2.	<p>Indicator</p> <p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Written tests and exams consisting of multiple choice, fill in the blank, and essay type questions are used to assess the knowledge of the student.</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is established based on a minimum passing score of 70% on written tests and exams.</p>
3.	<p>Indicator</p> <p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Practical lab exercises for this objective includes disassemble, identify repairs, and reassemble of the cold and hot section of the engine. The removal and installation, and inspection and repair of turbine engine components. The objective is demonstrated by the instructor, then the students are given the opportunity to complete each practical exercise</p>

Figure 4a. Assessment plan: Turbine engine overhaul

	<p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is measured by observing the students perform each exercise must be performed in accordance with industry standards manuals, or manufactures' manuals.</p>
	Indicator
	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Throughout the course the instructor is observing each student and classroom participation. Student's participation in the class practical lab exercises is encouraged.</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Each student is provided an opportunity to practice all Lab Exercises evaluation. Success is established when the student completes exercise without jeopardizing safety, damage to equipment, and with the guidance in the appropriate maintenance manual, FAA manufactures' manual, The students earn a pass or fail rating based on they completed the exercise.</p>
	Indicator
	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p>
	Indicator
	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p>
	Indicator
	<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p>
	Indicator

Figure 4b. Assessment plan: Turbine engine overhaul

Department <u>Aircraft Maintenance Technology</u> Academic Year _____	
Program Title and Degree (if applicable) <u>ACM 130 Sheet Metal Layout and Repair</u>	
Goal: <u>Provide instructions on the principles of sheet metal layout, bending, riveting, and structural inspections, and repair methods for aircraft as listed in FAR Part 145.</u>	
Intended Educational (Student), Research or Service Outcomes, Objectives or Expected Results (Please duplicate and use this page. It is best to include continuous numbers on each page.)	
Expected Results: Students satisfactorily completing all course objectives and achieving a passing grade for the course	
1.	<p>Indicator</p> <p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Means of assessment include written tests and exams, practical exercises, and instructor observations.</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is established based on a minimum passing score of 70% on written tests and exams. Success for practical lab exercises is determined by the project in accordance with established industry standards and specifications.</p> <p>Instructor's observation factors include safety, shop procedures, attitude, and</p>
2.	<p>Indicator</p> <p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Written tests and exams consisting of multiple choice, fill in the blank, and essay type questions are used to assess the knowledge of</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is established based on a minimum passing score of 70% on written tests and exams.</p>
3.	<p>Indicator</p> <p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Practical exercises for this objective include fabrication of u-channel, flange, and a joggle. Identification and installation of rivets, special composite structures, and repair of defective rivet holes in aircraft</p>

Figure 5a. Assessment plan: Sheet metal layout and repair

<p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Success is measured by observing the students perform each exercise must be performed in accordance with industry standards manuals, or manufactures' manuals.</p>	
Indicator	
<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Throughout the course the instructor is observing each student and classroom participation. Student's participation in the classroom practical lab exercises is encouraged.</p>	
<p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p> <p>Each student is provided an opportunity to practice all Lab Exercises evaluation. Success is established when the student complete exercise without jeopardizing safety, damage to equipment, and with the guidance in the appropriate maintenance manual, FAA manufactures' manual, The students earn a pass or fail rating they completed the exercise.</p>	
Indicator	
<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p>	
Indicator	
<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p> <p>Criteria for Success (Establishes the criteria for Program Success on Means of Assessment question "I know that I am successful when...")</p>	
Indicator	
<p>Means of Assessment (the procedures, strategies, or means by which you will collect the outcome objective)</p>	

Figure 5b. Assessment plan: Sheet metal layout and repair

Table 1. Student performance objectives for ground operations and safety course		
SPO Item #	Student Performance Levels	Student Performance Objectives

	Knowledge	Application	Manipulative Skills	
GOS 1	C	C	B	Demonstrate the ability to start, ground operate, tow (including pushback and gates), taxi, and secure aircraft
GOS 2	B	A	A	Demonstrate the ability to explain the procedures and precautions for fueling and defueling aircraft certified under FAR Part 23, and 25
GOS 3	C	C	A	Demonstrate the ability to select the appropriate MSD sheet for an item and identify the various information and warnings contained on MSDS sheet
GOS 4	C	C	A	Demonstrate the ability to explain the EPA, OSHA, and ICAO procedures for handling hazardous materials on and around aircraft
GOS 5	C	C	A	Demonstrate the ability to identify typical hazards found on aircraft ramp and hanger areas
GOS 6	C	C	A	Demonstrate the ability to explain standard safety practices and procedures for working on and around aircraft located on airport ramps
GOS 7	C	C	A	Demonstrate the ability to locate and explain OSHA standard safety practices and procedures for confined space entry
GOS 8	B	B	A	Demonstrate the ability to locate and explain OSHA Regulations related to aircraft maintenance activities
GOS 9	C	C	A	Demonstrate the ability to explain standard safety practices and procedures for working around jet blast hazard areas
GOS 10	B	B	B	Demonstrate the ability to perform aircraft interior, exterior and powerplant cleaning
GOS 11	B	A	A	Demonstrate the ability to explain the general properties and purposes of aircraft fuels, lubricants and greases
GOS 12	C	C	B	Demonstrate the ability to identify and select aircraft fuels
GOS 13	C	C	B	Demonstrate the ability to identify and select powerplant lubricants
GOS 14	C	C	B	Demonstrate the ability to identify and select hydraulic fluids
GOS 15	C	C	B	Demonstrate the ability to identify and select aircraft lubricants and greases
GOS 16	C	C	B	Demonstrate the ability to identify and select propeller lubricants
GOS 17	B	A	A	Demonstrate the ability to explain the procedures and precautions for deicing aircraft operating under FAR Part 121 and 135
				Demonstrate the ability to use proper hand signals for

GOS 18	C	C	C	taxiing and ground movement of aircraft
GOS 19	C	C	C	Demonstrate the ability to use proper voice procedures for aircraft radio transmissions

Table 2. Knowledge, application and manipulative skills framework

	Description
Student Performance Levels	<p>The student performance objective is a statement of desired learning outcomes in terms of student behavior. In addition, the student performance objective serves as a guide to the selection of strategies and methods of instruction, and provides criteria for evaluation of learning.</p> <p>The student performance objective number is an alphanumeric system that allows for the tracking of the student performance objective. The sequence of the student performance objective is not an indication of the order of instruction.</p>
Student Performance Levels	<p>Student performance levels provide the minimum standards of acceptable achievement that must be obtained by the student for each student performance objective. Due to the unique nature of each student performance objective the standards of performance required will be different for each student performance objective.</p> <p>Student performance levels are divided into three elements: knowledge, application and manipulative skills. Each element is further divided into three measures of performance.</p>
Knowledge	<p>Knowledge is the measurement of the students understanding of the principles, practices, and operational concepts of the subject or task. The three levels of performance are:</p> <ul style="list-style-type: none"> A- Basic knowledge of general principles or practices B- Knowledge of general principles, practices and operational concepts C- High level of knowledge of principles, practices and operational concepts
Application	<p>Application is the measurement of the students' ability to identify and apply rules or principles to solve a problem or complete a task with an element of difficulty. The three levels of performance are:</p> <ul style="list-style-type: none"> A- No practical application B- Limited practical application C- High degree of practical application
Manipulative Skill	<p>Manipulative Skills is the measurement of the students' ability to perform a task or process with speed, accuracy, and to accepted industry standards. The three levels of performance are:</p> <ul style="list-style-type: none"> A- No development of manipulative skills B- Development of sufficient manipulative skills to perform basic operations C- Development of manipulative skills required to simulate "return to service"

In addition to instructional material, course related web-sites were developed to complement existing classroom instructions. It is anticipated that the use of the Internet and multimedia in conjunction

with classroom instruction will provide students with better orientation in the use of computers. In the future, this facility can be used to facilitate distance learning programs. A web page was developed for the Ground Operations and Safety Course ([Figure 6](#)). Using the web site, students can access all information pertaining to the course, use the e-mail facility to contact the course instructor and interact with members on team projects using the chat room facility. The web site has the following specific features ([Figures 7 – 11](#)):

1. Course Outline: A detailed outline of the course, including the grading policy, the course content and the schedule is provided.
2. Calendar of Course Events: This utility allows the instructor to mark important dates and milestones using the calendar.
3. Mail: Students can setup their own e-mail accounts for the course.
4. Bulletin Board: This facility allows the instructor to set up on-line discussions on specific topics so that students enrolled in the course can participate.
5. Assignments: Course assignments and out-of-class reading/projects can be assigned by the instructor.
6. Chat: Using this utility, the instructor can set up discussion groups on various topics, facilitating communication between team members.
7. Lectures: Using this utility, the students can access Powerpoint or [HTML](#) format of the instructor's lecture notes.
8. Handouts: Instructors can post handouts for in-class and out-of-class readings.
9. Pictures: Using this utility, students can access pictures and videos that support lecture notes.



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Industrial En

ACM 115-A

Course Name Ground Operation and Safety

Course Timings Enter the course timings here

Location Enter the location here

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Instructor : Doyle W. Arnold
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chat

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Lectures

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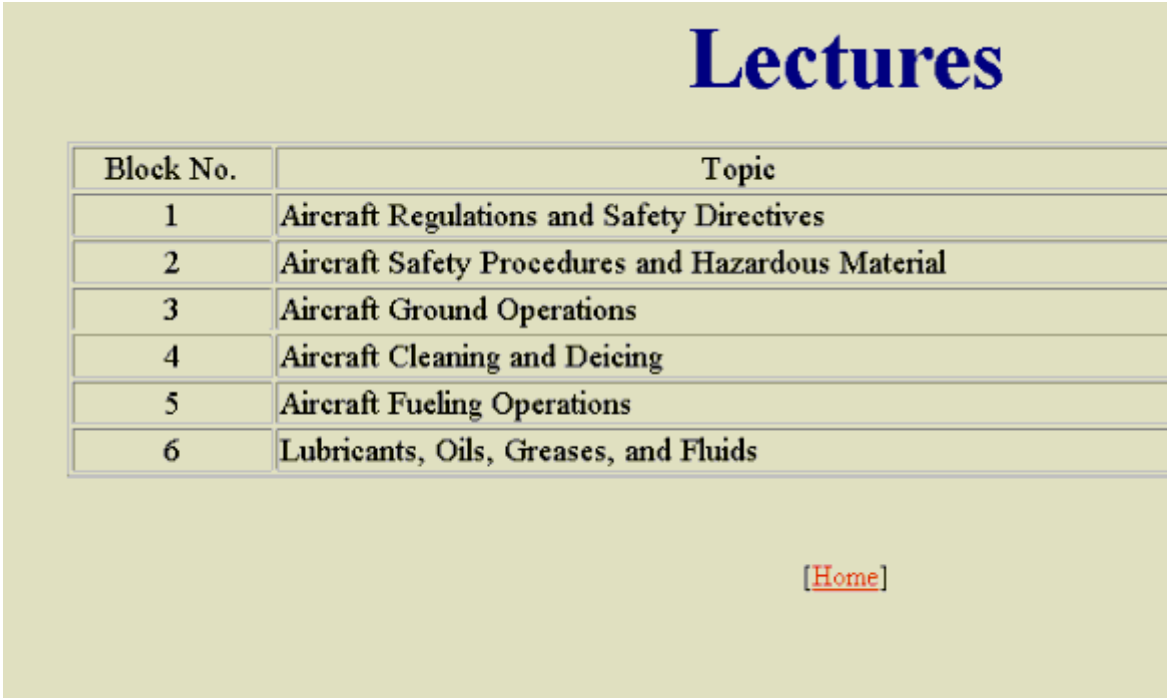
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[\[my WebCT\]](#)

Figure 6. Screen showing the welcome page to the web site and icons leading to the various course sites



The screenshot shows a web page with a light green background. At the top right, the word "Lectures" is written in a large, bold, blue serif font. Below this, there is a table with two columns: "Block No." and "Topic". The table contains six rows of data. At the bottom right of the page, there is a red text link labeled "Home" enclosed in a small rectangular box.

Block No.	Topic
1	Aircraft Regulations and Safety Directives
2	Aircraft Safety Procedures and Hazardous Material
3	Aircraft Ground Operations
4	Aircraft Cleaning and Deicing
5	Aircraft Fueling Operations
6	Lubricants, Oils, Greases, and Fluids

[Home](#)

Figure 7. Screen showing a list of the course topics posted on the site



Aircraft Regulations and Safety Dir

Given a list of hazardous chemical/materials associated with aircraft maintenance and repairs, locate the appropriate material safety data sheets (MSDS) and identify health hazards, warnings, routes of exposure, safe handling requirements, emergency and first aid procedures with error.

Figure 8. Screen showing the first slide of one of the course lectures

Pictures

Number	Picture Title
1	Picture 1
2	Picture 2
3	Picture 3

[\[Home\]](#)

Figure 9. Screen showing links to pictures of aircraft maintenance facilities

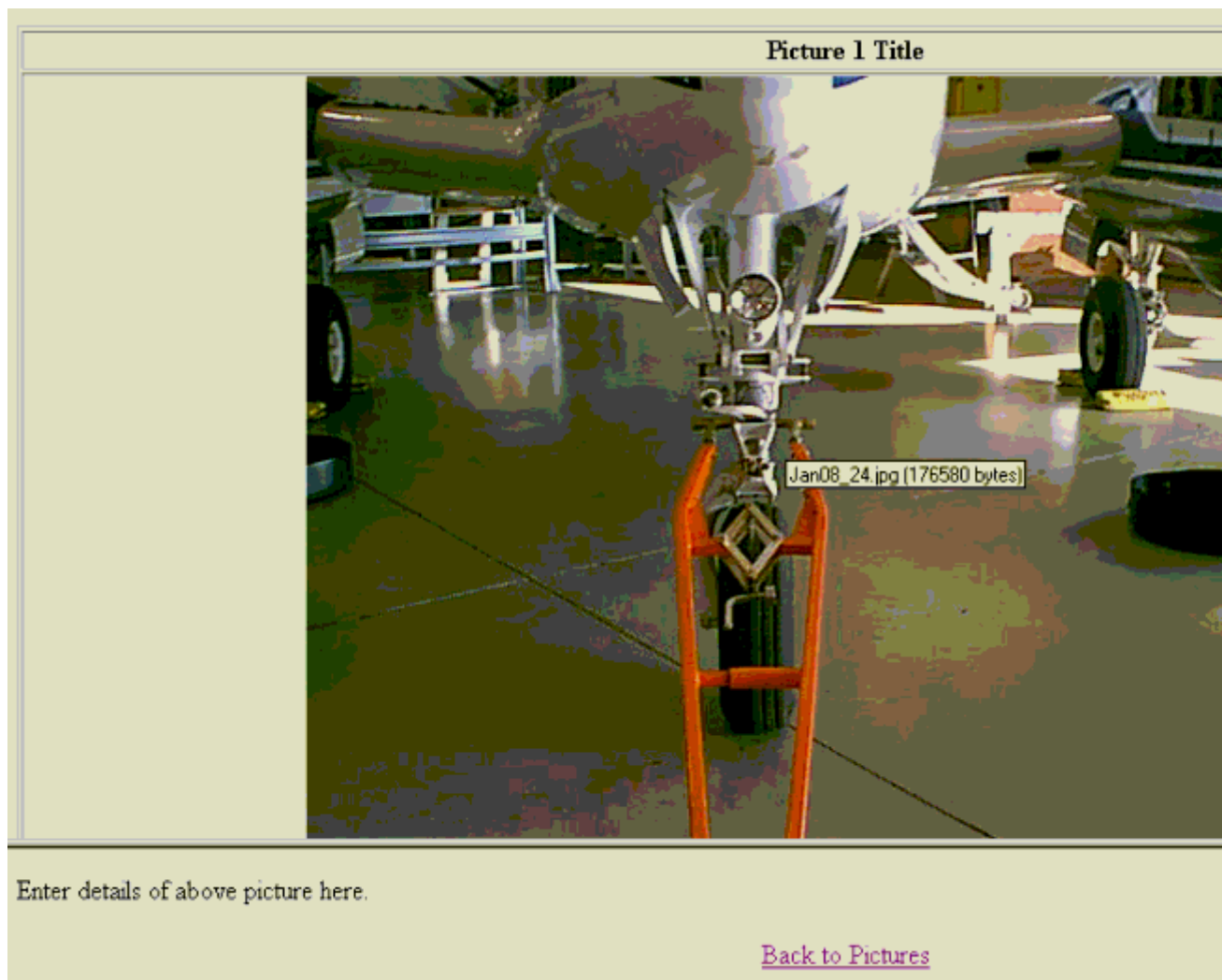


Figure 10. Screen showing a sample picture of an aircraft maintenance facility

Student Management

Page: 1 [Doe, Jones] [View Page Information](#)

First Name Edit	Last Name Edit	User ID	Quiz 1 Edit	Quiz 2 Edit
John	Doe	j +	9	7
Bob	Jones	bj +	10	8
Jenny	Jones	Jenny +	8	6

+ The user does not have a Global ID.

Home
 Back

Students: [Add](#) [Import from File](#) [Import from Global DB](#)

3 records

Figure 11. Screen showing grades of students for one of the course

Following the development of material for the revised Ground Handling and Services Course, appropriate methods of testing were developed/identified ([Tables 3 - 5](#)). These methods were selected so that they could measure the students' knowledge, application, and manipulative skill on each of the nineteen performance objectives ([Table 6](#)). [1,2,10,11,12,13,14,16,17](#) In addition to the mapping of performance objectives with the testing methods, a list of the advantages and disadvantages of the various testing methods were also developed ([Tables 6 and 7](#)). The course material along with the testing methods are being evaluated by SME (Subject Matter Experts) from the industry. Recommendations forthcoming from this evaluation will be incorporated into the first offering of the course set for the Fall 2000 Semester. In addition to the curriculum development activities, facilities were upgraded and resources were procured to deliver the revised course curriculum. This included the set-up of the smart classroom and the procurement of 24 multi-media workstations with Internet connections.

Table 3. Testing methods: Knowledge

	A	B	
Definition and	Basic knowledge of general principles or practices	Ability to select acceptable methods of accomplishing a task or objective. The	Ability to anal concept or pro

Description						student should be able to demonstrate by actually doing or following specific guidelines or procedures.					why certain pr do not
	Assessment-Multiple choice questions or matching. Ability to identify and select key terms and words and match them with their correct meaning or definition. Students should be capable of explaining general maintenance and safety procedures; such as when to wear hearing and eye protection. Instructor may provide some guidance for clarification of concepts or procedures					Assessment-fill-in the blank and essays type questions. In addition, the students should be capable of completing simple maintenance tasks such as installing common hardware, following maintenance procedures in a repair manual, and limited troubleshooting					Assessment type questions should be cap maintenance t engine magne carburetor, an problem using should be cap objective with instructor
Taxonomy	Skills Required					Skills Required					Skills Require
	1. Remembering an idea, material, or phenomenon in a form very close to that in which it was originally encountered. 2. To recall 3. To recognize 4. To acquire 5. To identify					1. Understanding the literal message contained in a communication 2. Inherent movement patterns that are formed by combining of reflex movements and are a basis for complex skilled movements 3. To transform 4. To paraphrase 5. To interpret 6. To infer 7. To conclude 8. To manipulate					1. Knowing an apply it without having been sho 2. Breaking d parts and detecti and the way they 3. Interpretati make adjustmen 4. To generali 5. To develop 6. To employ 7. To transfer 8. To distinguish 9. To detect 10. To restruct 11. To classify 12. Coordinat
Test Method	Multiple choice	Matching	Fill in the Blanks	Essay	Demonstration (Hands-on)	Multiple choice	Matching	Fill in the Blanks	Essay	Demonstration (Hands-on)	Multiple choice
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	

Table 4. Testing methods: Application

	A	B	
Definition and Description	No practical application	Limited practical application	High degree of practical application
	Assessment-not measured	Assessment-Multiple choice questions or matching. Demonstration of correct methods and procedures relating to simple mechanical exercises or projects. Student should be capable of completing basic tasks on an aircraft such as replacing spark plugs, changing engine oil and filters, and minor servicing such as tires and accumulators. Limited instructor	Assessment type questions. Ability to apply the correct cor Ability to explain why apply and others do n student should be ca specific maintenance timing an engine mag float on a carburetor,

		assistance may be provided to clarify procedures.					electrical problems u diagram. Student sho performing the objec assistance from the i				
Taxonomy	Skills Required					Skills Required					Skills Required
	1. No practical application 2. Assessment-not required					1. Breaking down ideas into their constituent parts and detecting the relationship of the parts and the way they are arranged. 2. Interpretation of stimuli that enable one to make adjustments to the environment. 3. To distinguish 4. To detect 5. To restructure 6. To classify 7. Coordinated movements					1. Breaking down ideas into their constituent parts and detecting the relationship of the parts and the way they are arranged. 2. Putting together elements to form a new whole 3. Interpretation of stimuli that enable one to make adjustments to the environment. 4. To distinguish 5. To detect 6. To restructure 7. To classify 8. To produce 9. To plan 10. To combine 11. To decide 12. To compare and contrast 13. Coordinated movements
Test Method	Multiple choice	Matching	Fill in the Blanks	Essay	Demonstration (Hands-on)	Multiple choice	Matching	Fill in the Blanks	Essay	Demonstration (Hands-on)	Multiple choice
	N/A	N/A	N/A	N/A	N/A	X	X	N/A	N/A	X	N/A

Table 5. Testing methods: Manipulative skills

	A	B	
Definition and Description	No development of manipulative skill	Development of manipulative skills to perform basic operations	Development of manipulative skills required to simulate
	Assessment-not measured	Assessment-Students should be capable of completing basic maintenance tasks such as installing common hardware or safety wiring. The student should be capable of completing basic maintenance operations and servicing such as changing engine oil or installing spark plugs. Proficiency levels for time may not be met but the quality of the work should meet established industry standards. Limited instructor assistance may be provided to clarify procedures	Assessment of performing complete maintenance tasks such as measuring crankshaft and rod bearing wear limits, adjusting metering systems to specifications, and is a problem using a wiring diagram and accuracy are a part of the maintenance tasks simulation. The student should be able to complete the tasks with assistance.

Taxonomy	Skills Required					Skills Required					Skills Required	
	1. No practical manipulative skills					1. Putting together elements and parts to form a new whole					1. Endurance, strength	
	2. Assessment-not required					2. Interpretation of stimuli that enable one to make adjustments to the environment.					2. Putting together elements to form a new whole	
						3. Coordinated movements					3. Interpretation of stimuli to make adjustments to the environment	
						4. To decide					4. Coordinated movements	
						5. To assemble					5. Quick, precise movements	
											6. To decide	
											7. To assemble	
Test Method	Multiple choice	Matching	Fill in the Blanks	Essay	Demonstration (Hands-on)	Multiple choice	Matching	Fill in the Blanks	Essay	Demonstration (Hands-on)	Multiple choice	
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	N/A	

Table 6. Mapping testing methods to performance objectives

GOS No.	Performance objectives	Skill	Level	Testing Methods					Imp.
				Multiple choice	Matching	Fill in the Blanks	Essay	Demons. (Hands-on)	
GOS 1	Ground operate aircraft engine, tow, taxi, and secure aircraft	K	C	X		X	X	X	
		A	C	X		X	X	X	
		MS	B	X				X	
GOS 2	Explain procedures and precautions for fueling and defueling aircraft certified under FAR Part 23 and 25	K	B	X		X	X	X	
		A	A	NA	NA	NA	NA	NA	
		MS	A	NA	NA	NA	NA	NA	
GOS 3	Select the appropriate MSDS sheet for an item. Identify various safety information and warning(s) contained on the MSDS sheet.	K	C	X		X	X	X	
		A	C	X		X	X	X	
		MS	A	NA	NA	NA	NA	NA	
GOS 4	Identify safety procedures required by OSHA,	K	C	X		X	X	X	

	ICAO, and the EPA for handling hazardous material(s) around aircraft.	A	C	X				
		MS	A	NA	NA	NA	NA	NA
GOS 5	Identify hazards located around aircraft and hanger maintenance areas	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	A	NA	NA	NA	NA	NA
GOS 6	Locate and explain safety practices and procedures for working around aircraft located on airport ramps	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	A	NA	NA	NA	NA	NA
GOS 7	Locate and explain OSHA safety practices and procedures for confined space entry	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	A	NA	NA	NA	NA	NA
GOS 8	Locate and explain OSHA Regulations related to aircraft maintenance activities	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	A	NA	NA	NA	NA	NA
GOS 9	Identify safety practices and procedures required when working around aircraft jet blast areas	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	A	NA	NA	NA	NA	NA
GOS 10	Perform aircraft interior, exterior, and powerplant cleaning	K	B	X		X	X	X
		A	A	NA	NA	NA	NA	NA
		MS	A	NA	NA	NA	NA	NA
GOS 11	Explain properties and the purpose of aircraft fuels, lubricants, and greases	K	B	X		X	X	X
		A	A	NA	NA	NA	NA	NA
		MS	A	NA	NA	NA	NA	NA
GOS 12	Identify and select the proper aircraft fuel grade	K	C	X		X	X	X

		A	C	X		X	X	X
		MS	B	X				X
GOS 13	Identify and select powerplant lubricants	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	B	X				X
GOS 14	Identify and select hydraulic fluids	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	B	X				X
GOS 15	Identify and select aircraft lubricants and oils	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	B	X				X
GOS 16	Identify and select propeller lubricants	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	B	X				X
GOS 17	Identify proper procedures and precautions for deicing an aircraft	K	B	X		X	X	X
		A	B	X	X			X
		MS	B	X				X
GOS 18	Direct aircraft movement using standard hand signals	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	B	X				X
GOS 19	Operate aircraft radios using proper communication procedures	K	C	X		X	X	X
		A	C	X		X	X	X
		MS	C	X		X	X	X

Table 7. Advantages and disadvantages of various test methods

Test method	Advantages	Disadvantages
Multiple Choice	<ol style="list-style-type: none"> 1. Access memory, recall and comprehension 2. Thinking and reasoning behaviors 	<ol style="list-style-type: none"> 1. guessing is a problem 2. tends to develop it

	<ol style="list-style-type: none"> 3. Sample a wide range of knowledge and skills in a short time period 4. can be designed to assess a variety of learning principles 5. cause and effect relationships 6. performance of mental processes 7. insight and critical analysis Factual Knowledge 8. measures Understandability 9. ability to apply concepts for knowledge to unique situations 	<ol style="list-style-type: none"> 3. coverage of content 4. does not allow students to present their own answers
Matching	<ol style="list-style-type: none"> 1. measures a trainee's ability to recognize relationships and make associations 2. measures factual knowledge and judgement 3. measure for who, what, when, where type of data 4. measure for application of knowledge 	<ol style="list-style-type: none"> 1. limited to accessing information 2. many areas of subject matter not covered by method 3. poor measure of individual differences
Essay	<ol style="list-style-type: none"> 1. ability to organize information and communicate that information effectively and efficiently 2. reason with or from the knowledge gained 3. can be used to tap learning planning, organization, integration, and effective expression of ideas 4. measures knowledge of facts 5. can measure higher levels of thinking, can encourage development of higher level thinking skills 6. encourages students to develop a comprehensive knowledge of specific facts and to discriminate among them 	<ol style="list-style-type: none"> 1. may discriminate against students who cannot communicate effectively 2. inappropriate for measuring creative ideas, writing abilities, and critical thinking skills. 3. may be influenced by test-taking strategies 4. scoring is usually subjective 5. requires a great deal of time to score a small sample of the student population
Short Answer and Fill in the Blank	<ol style="list-style-type: none"> 1. effective in measuring recall 2. sample a wide range of subject matter 3. discriminate activity 4. free from guessing if constructed properly 5. basic concepts 6. definitions 7. descriptive information 8. isolated facts 9. who, what, where, when type 10. solution of problems or situation type material 	<ol style="list-style-type: none"> 1. tends to measure verbal ability rather than an application of knowledge 2. extremely difficult to grade for correct response 3. encourages trainees to memorize 4. difficult to measure higher level thinking
Laboratory Exercise	<ol style="list-style-type: none"> 1. effective in measuring proficiency level in practical tasks 2. effective measure for measuring psychomotor skills 3. good for multi-domain learning 4. students solve a life-like problem that requires the identification of the issue and the selection for use of appropriate generalizations and skills 	<ol style="list-style-type: none"> 1. might discourage rote learning 2. testing process is generally time-consuming 3. can not be performed in a classroom setting

1.4 CURRICULUM ASSESSMENT

The classic closed-loop outcome based assessment methodology was used with the model for [AMT/T](#) and new [FAR](#) Part 66 curriculum ([Figure 12](#)) illustrating the paradigm.[15](#)

Methods of assessment were developed allowing the evaluators to determine whether or not the new curriculum has met program objectives and to test whether it has produced the desired learning outcomes and student behavior resulting in the desired performance levels. The assessment methodology evaluating the curriculum will focus on the following topics:

- Implementation issues
- Organizational issues
- Teaching issues
- Learning issues
- Workload issues
- Meeting [FAA](#) requirements
- Tracking student skills
- Tracking employer satisfaction
- Tracking student performance

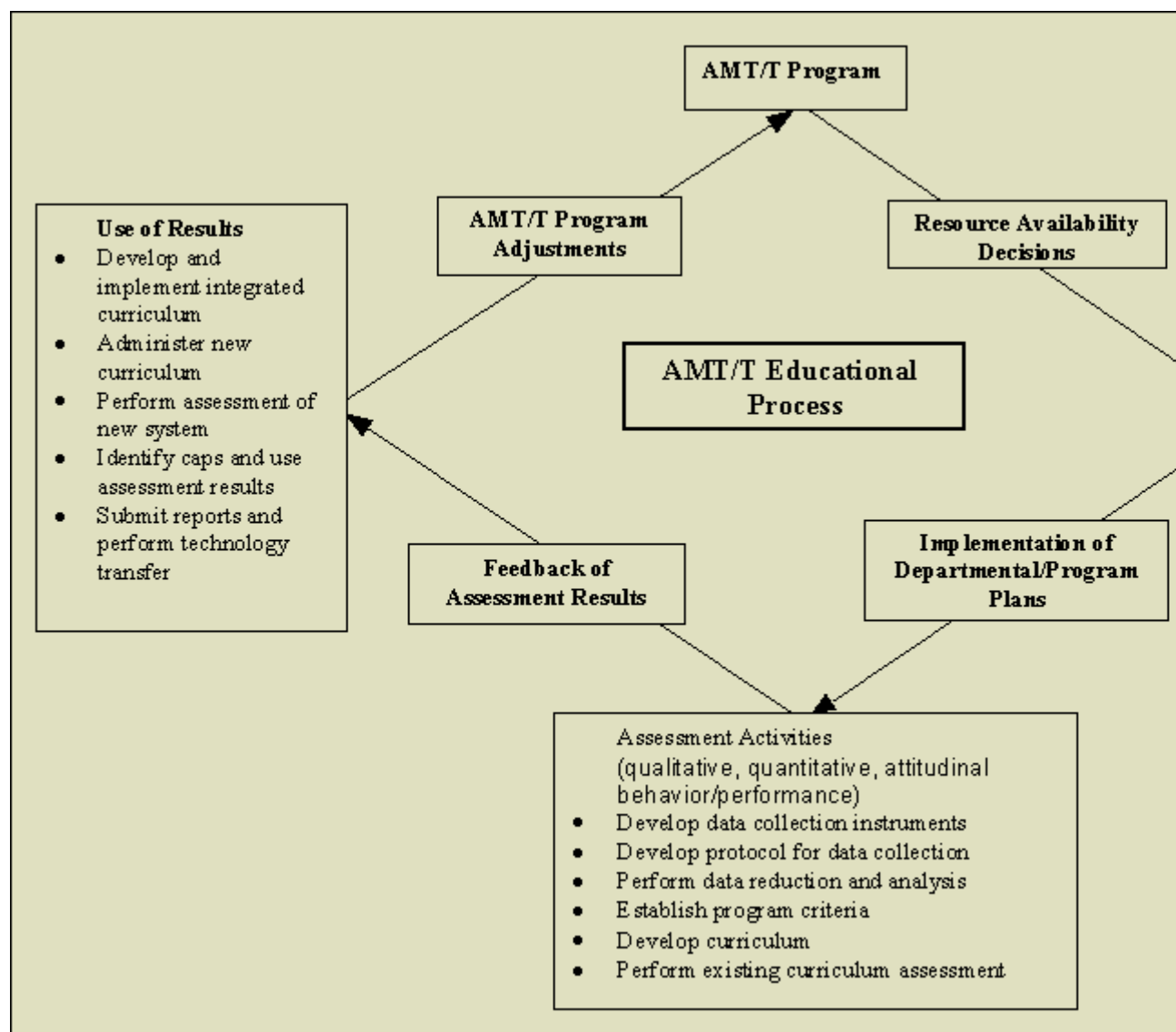


Figure 12. Model for AMT/T and new FAR Part 66 curriculum

While several assessment methodologies are in current use, they vary according to their suitability for different types of instruction. Thus, a battery of assessment tools will be used. Some of the ones most commonly used are described below.

1. Qualitative Assessment

The advantages of qualitative assessment include the ability to judge the whole within a context, flexibility in assessment, and the potential for revealing unexpected findings. The typical qualitative assessment tools include oral examinations, interviews, and juried competitions.

2. Quantitative Assessment (Cognitive, Attitudinal, Behavioral)

Cognitive Assessment measures student knowledge of the curriculum material on three levels, the basic knowledge of general principles or practices; the knowledge of general principles, practices and operational concepts; and the highest level of knowledge involving principles, practices and operational concepts. Cognitive tests commonly used include standardized tests, locally developed tests by experts/instructors, and course grades.

Attitudinal Assessment measures the beliefs and opinions of the students related to the learning context, their attitude toward the training process, and their role as an [AMT](#). Data to support these findings can be obtained from alumni and students who complete the program.

Behavior/Performance Assessment procedures assess the ability of the students to use and apply the knowledge as well as assessing their ability to perform tasks or processes with speed and accuracy acceptable industry standards.

Methods of assessment were developed that allow the evaluators to determine whether or not the revised course meets the desired objectives. In some cases existing instruments, including both qualitative and quantitative assessment tools, were modified for use. The specific tools used were as follows:

1. Teaching Evaluations ([Figure 13](#))

Objective: The objective of this evaluation is to obtain quantitative information on the course offering and the instruction through a standard questionnaire.

Issues Addressed: Course content, learning strategy, delivery, use of class time, grading, tests, instructor's expertise.

Timing and Protocol: The in-class evaluation is to be conducted by an assigned person not affiliated with the course toward the end of the semester/quarter by distributing the questionnaire.

Feedback: Feedback forms are shared with the course instructor and the Program Director. Summary/Averaged information is shared with the entire faculty.

Teaching Evaluation				
Instructor's Name _____				
Course Title _____			Section _____	
Course Information				
1. The course was well organized and outlined.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very S Agree
2. The syllabus was distributed and explained at the beginning of the co				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very S Agree
3. The textbook and course material supports learning.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very S Agree
4. The test assignments and examination questions measure skills, conc objectives that are relevant to the course.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very S Agree
5. The lab assignments supported my understanding of the course mater				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very S Agree
6. The equipment and supplies are adequate for completing lab exercise				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very S Agree
7. The course projects were challenging and helped me in understandin				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very S Agree

Figure 13a. Teaching evaluation

8. The course projects/lab assignments were based on real-world aircraft situations.

1	2	3	4
Very Strongly Disagree		Neutral	Very Strongly Agree

9. The course required the use of computers

Yes No

10. If the answer to the above question is Yes, explain how computers helped in the course

Explain:

Instructor Information

11. The instructor treated students with respect

1	2	3	4
Very Strongly Disagree		Neutral	Very Strongly Agree

12. The instructor's grading procedures provided me with a fair evaluation and understanding of the material.

1	2	3	4
Very Strongly Disagree		Neutral	Very Strongly Agree

13. The instructor used the time effectively and efficiently

1	2	3	4
Very Strongly Disagree		Neutral	Very Strongly Agree

14. The instructor's teaching methods helped me understand the course

1	2	3	4
Very Strongly Disagree		Neutral	Very Strongly Agree

Figure 13b. Teaching evaluation

15. The instructor presentation material and class notes are of high quality.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree
16. It is possible to easily access the presentation material during after-school hours.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree
17. The method of delivering instruction was highly effective.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree
18. The instructor made adequate use of computers to support instruction.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree
19. The instructor was enthusiastic about teaching.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree
20. The instructor's expectations were made clear to me.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree
21. The instructor motivated me.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree
22. I will recommend this course to another student.				
1	2	3	4	
Very Strongly DisAgree		Neutral		Very Strongly Agree

Figure 13c. Teaching evaluation

Student Information

1. I am satisfied with my accomplishments in this course,

Yes

No

2. I expect to receive the following grade on this course.

A

B

C

D

Fail

Write your responses to the following questions:

(1) Please list the strengths of the course and /or instructor?

(2) Please list the weaknesses of the course and /or instructor?

(3) Please provide suggestions to improve the course.

Figure 13d. Teaching evaluation

2. Instructor's Course Evaluations ([Figure 14](#))

Objective: The objective of this questionnaire is to obtain instructor information on the course as

it relates to availability of resources and student preparedness.

Issues Addressed: Instructional support, Resource availability, Course preparedness, Use of new instructional material, Student preparedness.

Timing and Protocol: The instructor completes the questionnaire at the conclusion of the course.

Instructor's Questionnaire						
Instructor Name _____		Course _____		Year _____		Qtr _____
Please provide information to the following questions						
<u>Self</u>						
I am extremely qualified in teaching this course						
1	2	3	4	5	6	7
Very						Very
Strongly						Strongly
Disagree						Agree
I was extremely well prepared in teaching this course						
1	2	3	4	5	6	7
Very						Very
Strongly						Strongly
Disagree						Agree
I used computers to support classroom teaching and delivering of instruction						
1	2	3	4	5	6	7
Very						Very
Strongly						Strongly
Disagree						Agree
<u>Course Content</u>						
The course content represents state of the art and the latest advancements in this top						
1	2	3	4	5	6	7
Very						Very
Strongly						Strongly
Disagree						Agree
The course uses hands-on projects that are representative of real world situations						
1	2	3	4	5	6	7
Very						Very
Strongly						Strongly
Disagree						Agree

Figure 14a. Instructor's course evaluation

The course makes use of team projects						
1	2	3	4	5	6	7
Very Strongly Disagree						Very Strongly Agree
The facilities and resources provided to support the course are excellent						
1	2	3	4	5	6	7
Very Strongly Disagree						Very Strongly Agree
The course integrates computer experience as part of projects and classroom teaching						
1	2	3	4	5	6	7
Very Strongly Disagree						Very Strongly Agree
The course provides introduction to human factors knowledge that is relevant to the course						
1	2	3	4	5	6	7
Very Strongly Disagree						Very Strongly Agree
<u>Student Preparedness</u>						
Students had suitable background and were qualified in taking this course						
1	2	3	4	5	6	7
Very Strongly Disagree						Very Strongly Agree
Students showed initiative and were motivated						
1	2	3	4	5	6	7
Very Strongly Disagree						Very Strongly Agree
Please provide additional comments that will help strengthening of the course						
<hr/>						
<hr/>						

Figure 14b: Instructor's course evaluation

3. Independent Structured Interviews with the Entire Class and the Instructor Conducted Separately by the Program Director ([Figure 15](#))

Objective: The objective of this assessment is to obtain detailed opinion on the specific course offering from both the students and the instructor(s).

Issues Addressed: The program director is tasked with soliciting opinion from students and instructors on the following: content of the course, delivery of instructions, availability of resources to support the course (e.g., projects), use of computers and advanced technology and other issues not addressed by teaching and course evaluations.

Timing and Protocol: The students' interview should take place during assigned class meetings following teaching and course evaluations.

Feedback: A summary report of the in-class interview is shared by the Program Director with the instructor of the course. A summary report of the instructor interview is shared with the entire faculty during regular faculty meetings.

CLASSROOM EVALUATION FORM

Instructor Observed _____ Course (section) _____
 Observer _____ Date _____

I. SETTING

A. Teaching method used in this class includes (check all that apply)

☐ Lecture ☐ Student Presentation ☐ Class Discussion
☐ Lab Work ☐ Other _____

B. Student Involvement Takes the Form of (check all that apply)

☐ Taking Notes ☐ Asking/Responding to Questions
☐ Participating in ☐ Working on Projects
☐ Making Presentations ☐ Other _____

II. PLANNING & ORGANIZATION (A = Acceptable; N = Needs)

☐ A. Begins class on time in orderly, organized fashion.
☐ B. Clearly states goals or objectives for the period.
☐ C. Reviews prior material as necessary.
☐ D. Summarizes and distills main points at end of class.
☐ E. Appears well prepared for class.
☐ F. Assignments are clearly stated.

Figure 15a. Classroom evaluation form

III. PRESENTATION (A = Acceptable; N = Needs Improvement)

- ☐ A. Incorporates various instructional supports like slides, diagrams, r
- ☐ B. Board writing is large and legible.
- ☐ C. Establishes and maintains eye contact with class.
- ☐ D. Responds to changes in student attentiveness.
- ☐ E. Use of humor is positive and appropriate.
- ☐ F. Communicates sense of enthusiasm and
- ☐ G. Presentation style facilitates note-taking.
- ☐ H. Speaks audibly, clearly, effectively.
- ☐ I. Selects teaching methods appropriate for content.
- ☐ J. Uses clear, relevant examples to illustrate

IV. INTERACTION AND RAPPORT (A = Acceptable; N = Needs

- ☐ A. Promotes student feedback and interaction.
- ☐ B. Knows and uses students' names.
- ☐ C. Recognizes when students do not understand.
- ☐ D. Encourages mutual respect between students.
- ☐ E. Gives students enough time to respond to questions.
- ☐ F. Responds to wrong answers and comments constructively, without
- ☐ G. Presents challenging questions to stimulate discussion.

Figure 15b. Classroom evaluation form

V. Content (A = Acceptable; N = Needs Improvement)

☐ A. Selects relevant examples and applications to complement course content.

☐ B. Integrates text material into class presentations.

☐ C. Relates current course content to students' general education.

☐ D. Presents views other than own when appropriate.

☐ E. Seeks to apply theory to problem solving.

☐ F. Explains terms, concepts, or problems in more than one way.

☐ G. Presents background of ideas and concepts when appropriate.

☐ H. Relates assignments to course content.

VI. ADDITIONAL COMMENTS

Figure 15c. Classroom evaluation form

4. Exit Survey ([Figure 16](#))

Objective: The objective of the exit survey is to solicit opinion from graduating students on the entire program and the educational experience.

Issues Addressed: Program usefulness, Instructor evaluation, Course evaluation

Timing and Protocol: Graduating students complete the survey in the final semester/quarter before their graduation.

<u>EXIT SURVEY</u>			
Gree			
Name: _____			
Last	First	Middle	Today's d
Social Security No.: _____		Sex: M F	Marital Status:
Date of Birth: ____/____/____	Graduation Date: ____/____/____	GPR: ____	
Current Address: _____			
(Circle Appropriate Responses Below)			
Degree from G'Tech: _____		Co-Op: Yes	
Work Plans: Number of job offers: _____		Salary range: \$ _____ to _____	
Accepted Employer's Name & Location: _____			

YOUR OPINION ABOUT THE CURRICULUM EMPHASIS IN YO			
(Check appropriate responses below)			
	TOO LITTLE	ABOUT RIGHT	TOO MU
English	_____	_____	_____
Mathematics	_____	_____	_____
Physics	_____	_____	_____
Humanities	_____	_____	_____
Engineering and technology	_____	_____	_____
Computer Utilization	_____	_____	_____
Curriculum Overall	_____	_____	_____
What Course did you find the most beneficial to your career path? _____			
What Course did you find the least beneficial to your career path? _____			
What did you like most about your department? _____			
What did you like least about your department? _____			

Figure 16a. Exit survey

Please rate from 1 to 5 the teaching effectiveness of the faculty members listed below. List catalog number which you had under the given faculty member. Only rate those members who have had actual classroom contact.

Rating Scale:

- (1) Outstanding
- (2) High Satisfactory, Very Good
- (3) Satisfactory, Good
- (4) Adequate, Fair
- (5) Unsatisfactory

Name	Rating	Course Number(s)	Comments
Allen Branch			
Bill Kendall			
Glenn Saccone			
Frank Webb			
Jacob Wilson			

AMT COURSE EVALUATION				
	Course	High Value		Average Value
GK	General Knowledge Instructional Unit	5	4	3
MKS	Basic Maintenance Knowledge and Skills Instructional Unit	5	4	3
ADAS	Aircraft Documentation and Administrative Skills	5	4	3
GOS	Ground Operation & Safety	5	4	3
PPT	Aircraft Powerplant Instructional Unit			
PPR	Turbine Engines	5	4	3
PPP	Reciprocating Engines	5	4	3
	Propellers	5	4	3
	Aircraft Electronics and Integrated Systems Instructional Unit			
AEIS-ET	Electrical Theory	5	4	3
AEIS-MP	Maintenance Practices for Electrical Systems	5	4	3
AEIS-EP	Electrical Power Generation Systems	5	4	3
AEIS-CNW	Communication, Navigation and Warning systems	5	4	3
AEIS-FMS	Flight Management Systems	5	4	3
ASYS	Aircraft Systems Instructional Unit	5	4	3
ASTR	Aircraft Structures Instructional Unit	5	4	3
AIC	Aircraft Inspections and Capstone Objectives Instructional Unit	5	4	3

Other comments or suggestions about the AMT Department:

Figure 16b. Exit survey

5. Alumni Survey ([Figure 17](#))

Objective: The objective of the survey is to gather information on the program and identify ways to enrich it using alumni input.

Issues Addressed: Job preparedness, Usefulness of skills learned, Limitations of the program,

Suggestions for improvement by addressing industry needs.

Timing and Protocol: The survey will be mailed to students with a minimum of one year of work experience and who continue to be employed by the aircraft maintenance industry or hold job titles related to the aircraft industry.

Alumni Survey

Date of Graduation: Month: _____ Year: 200__

The following questions deal with issues specifically concerning the Aircraft Maintenance and Technology Program. Please respond by circling the number of the appropriate response.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The AMT program prepared me well for the practice of aircraft maintenance related work.....	1	2	3	4	5
2. In comparison with my co-workers who graduated from other programs, I rate my education superior to theirs	1	2	3	4	5
3. My program prepared me well in the use of computers and computational techniques	1	2	3	4	5
4. My preparation in communication skills (written/oral) was excellent.	1	2	3	4	5
5. The overall quality of my department was excellent (compared with the rest of the College/University)	1	2	3	4	5
6. The departmental laboratory experience/projects prepared me well for the practice of my discipline	1	2	3	4	5
7. The overall departmental environment enhanced my education	1	2	3	4	5

8. Which of the following general categories best describes your current work assignment?

- | | | |
|------------------|-------------------------|--------------------------|
| 1) Maintenance | 4) Office work | 7) Other (specify) _____ |
| 2) Manufacturing | 5) Continuing education | |
| 3) Management | 6) Unemployed | |

9. What type of continuing education programs have you participated in? (circle all that apply)

- | | |
|--|---------------------------|
| 1) Formal graduate program | 4) Correspondence courses |
| 2) Selected formal courses | 5) None of the above |
| 3) Non-credit short courses (one or more days) | |

11. What do you do to consider to be the greatest strength of your Aircraft Maintenance and Technology program?

12. What do you consider to be the greatest weakness of your Aircraft Maintenance and Technology program?

13. What one or two specific curriculum changes would you recommend? Why?

14. Please provide (on back if necessary) any additional comments/suggestions concerning your department.


Figure 17. Alumni Survey

6. Employer's Survey of the Program and the Students ([Figure 18](#))

Objective: The objective of this survey is to solicit information from potential employers about the job preparedness of the students from the Greenville Tech [AMT](#) program and identify industry needs that can impact the overall program.

Issues Addressed: Student's job preparedness, Future needs of the industry

Timing and Protocol: Administered annually to employers of Greenville Tech graduates and reviewed yearly by the faculty.

 GREENVILLE TECH College That Works	EMPLOYER EVALUATION
--	----------------------------

Dear Employer:

At this time of year, Greenville Tech is once again reminded of the many opportunities graduates, and we appreciate the confidence you have placed in them. As we follow up have made, we request your assistance in completing this evaluation. As you may know Evaluation, which is an in-house confidential report for our administrative staff, will help of current Greenville Tech programs, program planning, and development for the future.

Please complete both sides of this questionnaire on this present or former employee an enclosed envelope. This graduate has given us permission to contact you, and for your frame we are asking that this evaluation be returned by June 4.

If you have any questions you may call Rhonda Topper at (864) 250-8478. Thank you. Please also include any suggestions you may have on improving our programs, as we are helping our graduates become more productive employees. Your evaluation will help us.

Sincerely,

Thomas E. Barton, Jr.
President

EMPLOYER: _____ **SUPERVISOR:** _____

GRADUATE DATA:

GRADUATE'S CURRENT STATUS

Is this graduate still employed by this company? ☐ Yes ☐ No

Graduate's job title: _____

If no longer employed: ☐ Resigned ☐ Laid Off ☐ Terminated

Reason for resignation or termination: _____

Figure 18a. Employer evaluation form

QUALITY OF EDUCATIONAL PREPARATION			
Please indicate how well Greenville Tech prepared this graduate for employment with respect to the areas/competencies listed below.			
	EXCELLENT	GOOD	NEEDS IMPROVEMENT
Technical knowledge and job skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attitude toward work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Human relations skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to learn on the job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comprehend and generate effective written and oral	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrate research skills necessary for personal and professional purposes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apply mathematical skills appropriate to solve day-to-day, as well as work-related, problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrate knowledge of computer applications compatible with job demands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exhibit professionalism appropriate to the values and ethics of his/her chosen career	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrate the critical thinking and problem-solving skills to fulfill work and personal responsibilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Practice interpersonal skills and teamwork in his/her professional life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demonstrate an awareness and understanding of various cultures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OVERALL JOB PREPARATION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ADDITIONAL INFORMATION

Would you be willing to serve on an advisory committee for this program? (Three – four meetings per year) ☐ Yes ☐ No

If another position were available, would you consider hiring a graduate from the same Greenville Tech program? (If no, please explain below.) ☐ Yes ☐ No

Please make comments and/or suggest ways Greenville Tech can better meet your needs _____

Figure 18b. Employer evaluation form

7. Course Information

Detailed records will be kept on the following: average grades obtained in the course and scores on select exams, test/quizzes and projects. In addition to these, longitudinal portfolios for select students will be retained.

In addition to the above, other indicators and sources of data will be used to provide information outside the scope of the formal assessment, to be used primarily in assessing the quality and in seeking improvements in departmental processes, course content and delivery, facilities and student services. These include anecdotal information which may be used by the Chair or discussed by the faculty leading to actions for improvement. In-class teaching evaluations were completed for the three courses, Ground Operations and Safety, Aircraft Powerplant (Gas Turbine Engine Model), and Aircraft Structures. Data obtained from the teaching evaluations were analyzed using the Wilcoxon test ([Tables 8 - 16](#)).

Table 8. Teaching evaluation: Course 1

Question #	Responses				
	Yes		No		
1. I am satisfied with my accomplishments in this course.	34		8		
2. I expect to receive the following grade on this course.	A	B	C	D	F
	15	18	6	1	1

Table 9. Student information: Course 1

Student #	Question #		
	1. Please list the strengths of the course and/or instructor.	2. Please list the strengths of the course and/or instructor.	3. Please provide suggestions to improve the course.
1	Good material, up-to-date aircraft	Hard to understand	Have the instructor explain himself
2	I learn a lot about airplanes. The instructor seems enthusiastic about the things we do. He provides an in-depth explanation of the things we go over.	The instructor needs to be clearer when we are in the classroom. I tend to get confused until we are in the hangar.	I would like it if we could do more hands on projects. Like working with the engines or letting us figure out how things work.
3	Hands on get to know more.		
4	It would lead you to knowing more about airplanes.	Not enough work in the labs	I suggest that we work on the engines a little more than we do. I think it would be easier to learn if it was a lot of hands-on-work.
5			
6	The instructor is able to communicate with students in a calm and professional manner. Instructor is nice and relates		

7	to students personally.		
8	The instructor knows what he is doing, he's been in this longer than us. He explains all the material to us without making us confused.	I think he needs to let us do more hands on work, it helps me to do and understand better.	
9	Textbooks are very helpful and the hands on make it more fun and easier to learn. Being able to work in pairs and groups on project help greatly. The class being smaller also helped because we could all take turns working on projects. We were all able to do everything ourselves. Comment: I have learned a lot in this course and I really enjoyed working with the planes.	Should have more studying, assignments to insure that the students know everything there is to know about this section of A.M. Needs to encourage the students to read the textbook.	Thorough explanations of each section (by the book) that was nothing is left out that may be important. Perhaps you could have two or three class dealing with different sections of A.M. so that the student can have a choice as to which course he/she wants to start with. (when you have more students of course).
1	Attendance 100%	None	
2			
3			
4	The course had hands on experience	You have to sit there and wait if you are not involved in the activity	
5	Labs, Tests	Lecture	Living up the lectures
6		None	Need help in lab. More instructors or qualified people to help start and taxi aircraft.
7	Frank is great at what he does. The grade is my fault	None	None
8	Course has basic skills in aircraft maintenance. Instructor is very fair, honest, and extremely knowledgeable.	None	Better Equipment
9	He gets the point across	Can ramble on	None
10	Teaches everything		
11	Instructor is very good	The tests are very tricky	I like the course as it is
12	Mr.Webb's knowledge of the subject is highly respectable. He is the	The only complaint I have about the course is, due to the size of the class (amt. of	

	instructor, which I have most enjoyed thus far. I would recommend his class to anyone. Also quite pleasant to talk to outside the class.		students) some of the lab activities (towing, aircraft runs, etc.) seemed rushed or could only be performed one time. This is in no way a reflection upon Mr. Webb's presentation of the material. As previously stated, I feel he is a wonderful instructor with professional knowledge of the subject.
13	This course helps people to get a better understanding of motors, towing, starting the aircraft.	We need more instructors so that we can get more accomplished during towing and engine runs so we won't have to sit around and wait.	More instructors to help us with motor runs and towing so that we don't have to sit around and wait.
14	Instructor is well organized, Highly skilled and has a vast encyclopedia of aircraft knowledge and wisdom inside his mind. He makes you really pull all the information out of your mind on his tests. But you know what you are doing.	The course was sort of fast paced, but given thoroughly. The weight and balance portion could be a little more detailed.	Suitable equipment for the lab. Field trips to real facilities as a lab course.
15			
16	Exact detail and correctness of instructor requires you to know and remember the material.	Not enough time.	Make it a smaller class or have 2 instructors during lab exercises.
17	The instructor is knowledgeable and is still interested in the aircraft (after all these years) His enthusiasm is motivational.	Time restraints for the course.	
18			
19	Class size made several tasks difficult to accomplish with any more than minimal familiarization. Instructor's real world experience made for invaluable insights.	Class size made several tasks difficult to accomplish with any more than minimal familiarization.	Teaching assistants to provide for availability to access lab equipment.
20	Instructor is very knowledgeable of the material.	Questions on the exams are vague. They are designed not to test a student's knowledge base, but to trick you into making a mistake. That is wrong!	
21	The instructor did very well managing the large number of students with the time available.	Not enough time.	Split the class in 2 batches.
1	Providing adequate information and learning opportunities in real world situation. Instructor explained material to the	Course:-none, Instructor at times seem nervous	Allow for more hand-on learning opportunities

	best of his knowledge. Labs well planned and all safety precautions taken.		
2	Good communication skills and a great personality	Doesn't have the ability to instruct. Thinks because he's never taught anything. The whole class in general didn't learn anything	Gary should sit in James or Bills class and be trained how to instruct by the way they do. These guys have a military instructors background
3	Good background in the field of study and genuinely tries to help students learn	Lab equipment inadequate- some broken or unable to be used, schedule conflicts between the classes	More equipment, better pm
4	None		
5	Access to actual aircraft and applying course knowledge	Not enough classes	More shop exercise
6	Does pretty good w/labs but has a hard time respecting students	None	More lab with equipment that works. No schedule conflicts between the classes and interference by the students of other classes
7	None	Instructor doesn't understand his own questions	none
8	None	None	None
9	None	None	None
10	More organized instructor and class time utilized constructively	Moments during labs when safety procedures were not followed and activities disorganized. Some of lab equipment are outdated and doesn't work	Improve lab equipment, conduct safer lab experiments
11	None	Lacks in understanding the course	More equipment to work with
12	Time well used for most part	Not familiar with material he was teaching, not prepared for questions, could not answer his own question, seemed disinterested	Replace instructor with one Qualified to educate students
13	None	None	None

Table 10. Student responses: Course 1

Question #	Likert Scale		Compared Mean	Mean(S.D.)	Wilcoxon test
	1	5			
1. The course was well organized and outlined.	Very Strongly	Very Strongly	3	4.19 (0.98)	(p<0.05)

	Disagree	Agree				
2. The syllabus was distributed and explained at the beginning of the course.	Very Strongly Disagree	Very Strongly Agree	3	4.60	(0.76)	(p<0.05)
3. The textbook and course material supports teaming.	Very Strongly Disagree	Very Strongly Agree	3	4.42	(0.79)	(p<0.05)
4. The test assignments and examination questions measure skills, concepts, and objectives that are relevant to the course.	Very Strongly Disagree	Very Strongly Agree	3	4.19	(1.03)	(p<0.05)
5. The lab assignments supported my understanding of the course material.	Very Strongly Disagree	Very Strongly Agree	3	4.40	(0.79)	(p<0.05)
6. The equipment and supplies are adequate for completing lab exercises.	Very Strongly Disagree	Very Strongly Agree	3	4.09	(1.15)	(p<0.05)
7. The course projects were challenging and helped me in understanding the course material.	Very Strongly Disagree	Very Strongly Agree	3	4.10	(0.90)	(p<0.05)
8. The course projects/lab assignments were based on real-world aircraft maintenance situations.	Very Strongly Disagree	Very Strongly Agree	3	4.31	(1.01)	(p<0.05)
11. The instructor treated students with respect	Very Strongly Disagree	Very Strongly Agree	3	4.58	(0.82)	(p<0.05)
12. The instructor's grading procedures provided me with a fair evaluation of my understanding of the material.	Very Strongly Disagree	Very Strongly Agree	3	4.39	(0.82)	(p<0.05)
13. The instructor used the time effectively and efficiently.	Very Strongly Disagree	Very Strongly Agree	3	4.41	(0.85)	(p<0.05)
14. The instructor's teaching methods helped me understand the course material.	Very Strongly Disagree	Very Strongly Agree	3	4.17	(1.07)	(p<0.05)
15. The instructor presentation material and class notes are of high quality.	Very Strongly Disagree	Very Strongly Agree	3	4.03	(1.14)	(p<0.05)
16. It is possible to easily access the presentation material during after-class hours.	Very Strongly Disagree	Very Strongly Agree	3	3.79	(1.10)	(p<0.05)
17. The method of delivering instruction was highly effective.	Very Strongly Disagree	Very Strongly Agree	3	3.98	(1.01)	(p<0.05)
18. The instructor made adequate use of computers to support instruction.	Very Strongly Disagree	Very Strongly Agree	3	2.13	(1.07)	(p<0.05)
19. The instructor was enthusiastic about teaching.	Very Strongly Disagree	Very Strongly Agree	3	4.19	(0.93)	(p<0.05)

20. The instructor's expectations were made clear to me.	Very Strongly Disagree	Very Strongly Agree	3	4.26 (0.98)	(p<0.05)
21. The instructor motivated me.	Very Strongly Disagree	Very Strongly Agree	3	3.91 (1.11)	(p<0.05)
22. I will recommend this course to another student.	Very Strongly Disagree	Very Strongly Agree	3	4.19 (1.14)	(p<0.05)

Question #	Responses	
9. The course required the use of computers.	Yes	No
	1	42
10. If the answer to the above question is Yes, explain how computers were used in the course.	No comments	

Table 11. Teaching evaluation: Course 2

Question #	Responses				
1. I am satisfied with my accomplishments in this course.	Yes		No		
	9		6		
2. I expect to receive the following grade on this course	A	B	C	D	F
	1	8	3	3	0

Table 12. Student information: Course 2

Student #	Question #		
	1. Please list the strengths of the course and/or instructor.	2. Please list the strengths of the course and/or instructor.	3. Please provide suggestions to improve the course.
1			
2			
3		The instructor has a very negative attitude towards the school and tries to make the students feel like failures. The instructor has nothing good to say about any work done in the Lab.	

		Makes derogatory remarks to students when students do well on exams	
4			
5	Very informative		More Lab time.
6	Promotes learning environment. Tries his best to help students understand and use what they learn	Lab equipment needs upgrading, needs to be a little more enthusiasm	Better equipment
7			
8			
9			
10	Teaches enough material to understand sheet metal. Lab activities were fun and interesting.	Lack of up to date tools. Not enough Lab time. Instructor was not thorough enough when helping in Lab.	Larger facilities for Lab hours, better quality tools, longer class and Lab hours
11	Knowledgeable on material, but not enough time spent in Lab.	Knowledgeable on material, but not enough time spent in Lab.	More Lab time to apply classroom lessons
12			
13	The course is tested too strongly in areas that are less important. For instance, in setting up rivet rows, pitches and patterns the # of rivets can vary, but on the test he grades too harshly if the # of rivets aren't exact.	The instructor does not motivate the class at all.	A new instructor
14	Well organized. Good notes	Instructor showed no enthusiasm. Was not supportive to us during labs. Only criticized performance.	Have an instructor that wants students to succeed not fail!
15	Knowledge of Course material	Negative Attitude towards A & P opportunities	

Table 13. Student responses: Course 2

Question #	Likert Scale	Compared Mean	Mean(S.D.)	Wilcoxon test
	1	5		

1. The course was well organized and outlined.	Very Strongly Disagree	Very Strongly Agree	3	3.87	(0.74)	(p<0.05)
2. The syllabus was distributed and explained at the beginning of the course.	Very Strongly Disagree	Very Strongly Agree	3	3.93	(0.88)	(p<0.05)
3. The textbook and course material supports teaming.	Very Strongly Disagree	Very Strongly Agree	3	3.87	(0.74)	(p<0.05)
4. The test assignments and examination questions measure skills, concepts, and objectives that are relevant to the course.	Very Strongly Disagree	Very Strongly Agree	3	3.87	(0.83)	(p<0.05)
5. The lab assignments supported my understanding of the course material.	Very Strongly Disagree	Very Strongly Agree	3	3.87	(0.83)	(p<0.05)
6. The equipment and supplies are adequate for completing lab exercises.	Very Strongly Disagree	Very Strongly Agree	3	3.53	(1.06)	(p>0.05)
7. The course projects were challenging and helped me in understanding the course material.	Very Strongly Disagree	Very Strongly Agree	3	4.00	(0.93)	(p<0.05)
8. The course projects/lab assignments were based on real-world aircraft maintenance situations.	Very Strongly Disagree	Very Strongly Agree	3	3.67	(0.98)	(p<0.05)
11. The instructor treated students with respect	Very Strongly Disagree	Very Strongly Agree	3	3.20	(1.32)	(p>0.05)
12. The instructor's grading procedures provided me with a fair evaluation of my understanding of the material.	Very Strongly Disagree	Very Strongly Agree	3	3.60	(1.06)	(p>0.05)
13. The instructor used the time effectively and efficiently.	Very Strongly Disagree	Very Strongly Agree	3	3.93	(0.80)	(p<0.05)
14. The instructor's teaching methods helped me understand the course material.	Very Strongly Disagree	Very Strongly Agree	3	3.53	(0.99)	(p>0.05)
15. The instructor presentation material and class notes are of high quality.	Very Strongly Disagree	Very Strongly Agree	3	3.40	(0.99)	(p>0.05)
16. It is possible to easily access the presentation material during after-class hours.	Very Strongly Disagree	Very Strongly Agree	3	3.00	(1.20)	(p>0.05)
17. The method of delivering instruction was highly effective.	Very Strongly Disagree	Very Strongly Agree	3	3.40	(0.83)	(p>0.05)
18. The instructor made adequate use of computers to support instruction.	Very Strongly Disagree	Very Strongly Agree	3	2.29	(1.03)	(p<0.05)

19. The instructor was enthusiastic about teaching.	Very Strongly Disagree	Very Strongly Agree	3	3.13 (1.13)	(p>0.05)
20. The instructor's expectations were made clear to me.	Very Strongly Disagree	Very Strongly Agree	3	3.73 (1.16)	(p<0.05)
21. The instructor motivated me.	Very Strongly Disagree	Very Strongly Agree	3	2.73 (1.10)	(p>0.05)
22. I will recommend this course to another student.	Very Strongly Disagree	Very Strongly Agree	3	3.07 (1.39)	(p>0.05)

Question #	Responses	
9. The course required the use of computers.	Yes	No
	0	14
10. If the answer to the above question is Yes, explain how computers were used in the course.	No comments	

Table 14. Teaching evaluation: Course 3

Question #	Responses				
1. I am satisfied with my accomplishments in this course.	Yes		No		
	14		1		
2. I expect to receive the following grade on this course.	A	B	C	D	F
	7	5	2	0	0

Table 15. Student information: Course 3

Student #	Question #		
	1. Please list the strengths of the course and/or instructor.	2. Please list the strengths of the course and/or instructor.	3. Please provide suggestions to improve the course.
1		More turbines to work on more updated lab work	
2	Material & AC is outdated	Old airplanes, worn out tools and equipment.	Teach what student will do in reality, break up class time and labtime
3			
4	Experience level of the instructor	Need to cover more real time jet engines & split 50/50 with general aviation	
5		Need to update technology, to equal the way these fbo operate	Stop teaching in depth functions
6	Instructor was fair	Lab project were unacceptable, tooling was not good, learning aids were	Get up to date materials, provide proper tools

7	Very informative course about general light aircraft maintenance.	old Course needs to cover more on large commercial aircraft maintenance	
8			
9	Instructor well prepared and willing to teach	Instructors text book and prescribed text book are different	Change powerplant books, better lab equipment
10	Good instructor		Update equipment./special tools
11	Promoted good hands on general aviation A/C	Need to work in section and hands on maintenance for AC	One particular text book and not multiple books
12	Instructor is thorough and effective	Powerplant book not adequate	Better tooling in lab, better vending area at the satellite location at donaldson center.
13			
14	Material in text book along with lab was put to good use	Different text book used by instructor made the course confusing	Instructor needs to control class cut ups better
15	Clear concise instruction, demonstration of hands on techniques		Improve lab equipment

Table 16. Student responses: Course 3

Question #	Likert Scale		Compared Mean	Mean(S.D.)	Wilcoxon test
	1	5			
1. The course was well organized and outlined.	Very Strongly Disagree	Very Strongly Agree	3	3.67 (0.82)	(p<0.05)
2. The syllabus was distributed and explained at the beginning of the course.	Very Strongly Disagree	Very Strongly Agree	3	4.27 (0.70)	(p<0.05)
3. The textbook and course material supports teaming.	Very Strongly Disagree	Very Strongly Agree	3	3.33 (1.18)	(p>0.05)
4. The test assignments and examination questions measure skills, concepts, and objectives that are relevant to the course.	Very Strongly Disagree	Very Strongly Agree	3	3.93 (1.03)	(p<0.05)
5. The lab assignments supported my understanding of the course material.	Very Strongly Disagree	Very Strongly Agree	3	3.60 (0.74)	(p<0.05)
6. The equipment and supplies are adequate for completing lab exercises.	Very Strongly Disagree	Very Strongly Agree	3	2.40 (0.98)	(p>0.05)
7. The course projects were challenging and helped me in understanding the course material.	Very Strongly Disagree	Very Strongly Agree	3	3.47 (0.83)	(p>0.05)
8. The course projects/lab	Very	Very	3	3.27 (0.88)	(p>0.05)

assignments were based on real-world aircraft maintenance situations.	Strongly Disagree	Strongly Agree				
11. The instructor treated students with respect	Very Strongly Disagree	Very Strongly Agree	3	4.47	(0.74)	(p<0.05)
12. The instructor's grading procedures provided me with a fair evaluation of my understanding of the material.	Very Strongly Disagree	Very Strongly Agree	3	4.27	(0.80)	(p<0.05)
13. The instructor used the time effectively and efficiently.	Very Strongly Disagree	Very Strongly Agree	3	4.07	(0.80)	(p<0.05)
14. The instructor's teaching methods helped me understand the course material.	Very Strongly Disagree	Very Strongly Agree	3	4.00	(0.65)	(p<0.05)
15. The instructor presentation material and class notes are of high quality.	Very Strongly Disagree	Very Strongly Agree	3	3.67	(0.62)	(p<0.05)
16. It is possible to easily access the presentation material during after-class hours.	Very Strongly Disagree	Very Strongly Agree	3	3.93	(0.59)	(p<0.05)
17. The method of delivering instruction was highly effective.	Very Strongly Disagree	Very Strongly Agree	3	3.73	(0.88)	(p<0.05)
18. The instructor made adequate use of computers to support instruction.	Very Strongly Disagree	Very Strongly Agree	3	2.29	(1.03)	(p<0.05)
19. The instructor was enthusiastic about teaching.	Very Strongly Disagree	Very Strongly Agree	3	4.33	(0.62)	(p<0.05)
20. The instructor's expectations were made clear to me.	Very Strongly Disagree	Very Strongly Agree	3	4.33	(0.62)	(p<0.05)
21. The instructor motivated me.	Very Strongly Disagree	Very Strongly Agree	3	4.07	(0.70)	(p<0.05)
22. I will recommend this course to another student.	Very Strongly Disagree	Very Strongly Agree	3	3.80	(1.15)	(p>0.05)

Question #	Responses	
9. The course required the use of computers.	Yes	No
	0	15
10. If the answer to the above question is Yes, explain how computers were used in the course.	No comments	

1.5 DISCUSSION AND CONCLUSIONS

The focus of this research is the implementation and assessment of the integrated [AMT/AMT-T](#) curriculum on aircraft maintenance technology learning, aircraft maintenance technology performance (the ability to meet performance objectives and demonstrate acceptable performance), and on-the-job performance as demanded by the aircraft maintenance industry and the [FAA](#). The results obtained from Year 2 activities will facilitate the establishment of technician performance benchmarks relative to the integrated curriculum requirements.

The curriculum development and assessment methodology developed as part of Year 1 activities will serve as a road-map for other [AMT](#) programs embarking upon implementation of the integrated curriculum. These activities have led to the development of course material for the Ground Handling and Services Course. This curriculum material provides a detailed set of guidelines on training strategies and methods and on the use of alternate instructional delivery systems mechanism for more effective and efficient AMT/[AMT-T](#) instruction. Moreover, it also demonstrates how computers and human factors knowledge can be integrated into the aircraft maintenance technology curriculum. The same methodology will be followed in developing course material for the Aircraft Power Plant (Gas Turbine Engine Model) and Aircraft Structures courses.

The assessment the methodology developed when deployed during Years 2 and 3 will lead to the evaluation of the relative merits/consequences of the integrated curriculum and an evaluation of the use of advanced technology and alternative learning strategies (e.g., classroom, multimedia based, etc.) in implementing the curriculum and enhancing the learning experience. The use of results obtained from the assessment will form the foundation for further enhancement of the training process for the integrated [AMT/AMT-T](#) curriculum

Improvements in teaching and learning will be achieved through networking in industry and professional organization affiliations and through the integration of programs with local high schools. The [GTC](#) program has in place an articulation agreement with a local high school career center by which students can earn advanced placement credit toward the [GTC AMT](#) program. In addition, the GTC AMT Department is actively involved in co-op/work study programs with [LMAC](#), Stevens Aviation, AlliedSignal, and others where many of the current program students and graduates are now employed.

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